

its *Cysticercus*. It is true that we have not made a special search; but the veterinary surgeons and slaughterhouse-men have never observed it. One must conclude that this *Cysticercus* is never very abundant in the animals that it inhabits. One may, however, remark that the *Cysticercus* cannot be absolutely rare, since its *Tænia* is frequent. . . ."

He gives also, on pl. i. fig. 6, a drawing of this *Cysticercus* (of *T. saginata*), and refers to a fold, *p'*, near the external opening of the canal, which he found constant in the six or seven specimens he examined.

In my specimens, although there were suggestions of this fold, it was never so well marked as in his drawings, and was not unfrequently altogether absent.

#### EXPLANATION OF PLATE II.

*Figs. 1-4.* Enlarged views of the whole *Cysticercus*.

*Fig. 5.* Longitudinal section through anterior extremity, passing through the canal and the prominence of head of future *Tænia*.

*Fig. 6.* Prominence of head of future *Tænia*, showing suckers and absence of hooklets.

*c* = calcareous corpuscles; *h* = prominence of head of future *Tænia*; *m* = muscular fibres; *o* = opening at anterior extremity; *p*, posterior extremity, in most instances notched; *s* = sucker; *v* = vessels.

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## II.—On the Fructification of *Eusphenopteris tenella*, Brongn., and *Sphenopteris microcarpa*, Lesq. By ROBERT KIDSTON\*.

[Plate I.]

### I. *Eusphenopteris* (*Sphenopteris*) *tenella*, Brongn. (Pl. I. figs. 1-6.)

Histoire des Végétaux fossiles, pl. 49. fig. 1; Illustrations of Fossil Plants, pl. xxxix.†

The barren and fertile fronds of this fern are dissimilar; and were it not for their occurring in unusually favourable circumstances, it would be impossible to ascertain that these two forms of fronds belong to the same species. I have found no fern associated with *Eusphenopteris tenella*, with the exception

\* Communicated by the Author, having been read before the Royal Physical Society, Edinburgh, April 19, 1882.

† Edited by G. A. Lebour, 1877.

of a single specimen of *Sphenopteris delicatula*, Sternberg\*, which appears, however, rather to be a small variety of *E. tenella* than a distinct species, as they are connected by intermediate forms. This circumstance appears to prove conclusively that the fructifying fronds can only belong to *E. tenella*.

All the fruiting fronds of this fern with which I have met were collected by myself at Furnace Bank, Sauchie, near Alloa, where it occurs very plentifully, but is limited to a single bed of arenaceous shale overlying the coal, which is at present being worked.

Figs. 1 and 2 show two of the most common types of this plant as met with at Sauchie. Brongniart's figure represents only a small portion of a frond; a much better specimen is shown in the 'Illustrations of Fossil Plants;' but it is there only designated "*Sphenopteris* sp."

*Eusphenopteris tenella* must have attained considerable size, as one of my specimens shows pinnæ 7 inches long, given off from an axis only the eighth of an inch thick. Of the barren fronds, some are lax and others much more compact; we have in the fertile fronds similar distinctions. This is shown in figs. 3 and 4. The capsules or urceolate indusiums are oval in form, and show a small depression at their apex, which probably indicates the position of an aperture (figs. 3 and 4). Their greatest length measures  $\frac{1}{2\frac{1}{5}}$  of an inch. They are arranged in two rows, one on each side of the rachis of the pinnule, the capsules being alternate, as shown in figs. 4 and 6; but they commonly appear as secund, the one row being bent over the other. This is well shown in fig. 3.

The different positions of the capsules are probably dependent upon their state of ripeness when fossilization took place. From the fine state in which the specimens are preserved, the outline of the cells composing the capsules is distinctly shown.

The affinities of this fern to recent genera are somewhat obscure. The capsules in form resemble those of *Hymenostachys* (Hymenophyllaceæ); but in the fossils there is no discernible trace of a column, which forms a constant character in that genus. They agree, however, in the dimorphic condition of the fronds. I fear that at present we can only presume that this fern is most probably referable to the Hymenophyllaceæ. Both fertile and barren fronds are plentiful in the Coal-measures, Sauchie, near Alloa; and a fine barren speci-

\* 'Essai d'un Exposé Geognostico-Botanique,' Sternberg, pl. 26. fig. 5.

men is exhibited in the Museum of the Glasgow University, from the "Roof of the Kiltongue Coal, Bailieston."

I have placed this fern in Schimper's *Eusphenopteris* in preference to Brongniart's generic name of *Sphenopteris*, as those individuals with cuneate segments form a very distinct group of the Sphenopteroids, and their removal from *Sphenopteris* helps to simplify that complex genus\*.

In some recent works on vegetable palæontology attempts have been made to found a classification of ferns on the basis of their fructification; but so few fossil ferns having been obtained in this state has necessitated the introduction of two sets of characters in the classification of one group of plants: viz. those found in fruit are classified according to the structure and arrangement of that organ; but those whose fruit is still unknown, are classified, as formerly, from characters possessed by the barren fronds.

If the system of classification according to fruit be adopted with *E. tenella*, I believe a new genus would be required for its reception; but for the foregoing reasons I prefer retaining it with the other Eusphenopteroids till more is known of their fruit. Even were there evidence for a complete classification founded on the fruit, it would prove of little value to the working palæontologist, who has, in the great majority of cases, to deal with barren specimens.

## II. *Sphenopteris microcarpa*, Lesq. (Pl. I. figs. 7-14.)

Atlas of Coal Flora of Pennsylvania, pl. xlvii. fig. 2; Coal Flora of Pennsylvania, p. 281.

About two years ago Mr. J. Bennie handed to me for examination a small specimen of this fern, beautifully fruited, but which at the time I was unable to identify. Shortly after I saw a copy of the 'Atlas to the Coal Flora of Pennsylvania and the United States,' by Lesquereux, which was published in 1879. On plate xlvii. fig. 2 of this work a small Sphenopteroid is illustrated under the name of *Sph. microcarpa*; but from the figure given I could not definitely determine that the plant collected by Mr. Bennie belonged to the same species, and at that time no description of it had appeared. This lack, however, was supplied in 1880, when the same author published the 'Description of the Coal Flora of the Carboniferous Formation,' &c. He gives here a very good description of the barren fronds; and in regard to the fertile it is stated that "each of the small obtuse teeth or indentations on the borders of the lobes has, at the top of one

\* Schimper und Zittel, 'Handbuch der Paläontologie,' p. 107.

or two of the veinlets, small round elevated dots, which, when seen with a glass, appear like sori. I consider them as fructifications, comparable, by their position at least, to the fruit-dots of some *Duvallicæ* of our time—*Leucostegia* for example”\*.

In the present specimen the fruit is exceptionally well preserved, showing the outline of the cells which form the walls of the sporangia (figs. 12, 13, and 14).

The sporangia appear to be usually developed in groups of three, situated at the upper extremity of the veins, so that they become marginal in position (fig. 10). Sometimes, however, they are produced singly, as in fig. 11; but such cases are rare. I have not observed any sporangia situated in the sinuses; they are placed in the little lobes or teeth of the pinnules. The imperfect manner in which Lesquereux’s specimen appears to be preserved may have led to this slight mistake in his description. The sporangia are oval in outline, and about  $\frac{1}{75}$  of an inch wide in their greatest diameter. Most of them show a marginal border; and in one individual (fig. 14) the cells composing it appear to lie at an oblique angle to those forming the large central part; but whether this border is a true annulus or only a mechanically-produced simulation of that structure I am unable to decide.

Grand'Eury † describes the fruit of *Sphenopteris chærophyллоides*, the sporangia of which appear to be very similar to those under consideration. In reference to his specimen, however, he states that the sporangia were not provided with an annulus. He seems inclined to regard *Sph. chærophyллоides* as a transitional form between *Schizæa* and *Marattia*.

As regards *Sphenopteris microcarpa*, I think the character of the fruit points to affinities with the Osmundaceæ, and it is probably most closely related to the genus *Todea*. This species is widely distributed in the Coal-measures of Scotland.

I am indebted to Mr. James Bennie for the pleasure of examining the fruited specimen, which was collected by him near Dysart, Fife. Mr. Thomas Naismith has also kindly shown me the same plant from Mount Vernon, Lanarkshire; and I have met with it at Sauchie, near Alloa, Clackmannanshire, and near Dollar, on the borders of Perthshire.

None of the Carboniferous ferns which from time to time have been obtained in fruit appear to be referable to existing genera. Though in many cases they approach very closely,

\* *Loc. cit.* p. 280.

† ‘Flore Carbonifère du Département de la Loire!’ Paris, 1877.

yet they have hitherto always shown some character which has necessitated their being kept separate\*.

EXPLANATION OF PLATE I.

*Eusphenopteris tenella*, Brong.

- Fig. 1.* Portion of barren frond from Sauchie, near Alloa.  
*Fig. 2.* Portion of larger form from same locality.  
*Fig. 3.* Fertile frond, lax form, from same locality.  
*Fig. 4.* Fertile frond, compact form, from same locality.  
*Fig. 5.* Sporangia or capsules, magnified, showing the small apical aperture.  
*Fig. 6.* The same, viewed more obliquely.

*Sphenopteris microcarpa*, Lesq.

- Fig. 7.* Portion of barren frond, from near Dollar, collected by Mr. A. E. Grant.  
*Fig. 8.* Pinnule, enlarged.  
*Fig. 9.* Portion of fertile frond, from near Dysart.  
*Fig. 10.* Pinnule of fig. 9, enlarged, showing sporangia arranged in groups of three.  
*Fig. 11.* Another pinnule, enlarged, more sparsely fruited.  
*Fig. 12.* Two sporangia, magnified, showing slight indication of a marginal border.  
*Fig. 13.* Sporangium, magnified, showing a slight obliquity of the arrangement of cells forming the marginal border.  
*Fig. 14.* Another sporangium, magnified.

*Note.*—In fig. 7 the engraver has missed the character of the plant. The ultimate pinnules are represented as merged together, but should be distinctly separate, as shown in the enlarged figure (8).

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III.—*On certain Limpets and Chitons from the Deep Waters off the Eastern Coast of the United States.* By W. H. DALL†.

I HAVE received from Prof. Verrill certain limpets or patelli-form shells and chitons collected under his supervision off the south-east coast of New England, in deep water, by the United-States Fish-Commission parties in 1881, with his kind permission to describe them. Though without particular beauty and of small size, the hope that these specimens would prove of interest has not been disappointed.

Limpets are generally shore or shallow-water mollusks ;

\* Stur, in his 'Culm Flora,' describes a fossil fern (*Todea Lipoldi*), which appears to be similar to *Sphenopteris bifida*, L. & H. As its fruit is unknown, his reason for placing it in the genus *Todea* seems simply to rest on the segmentation of the frond being somewhat of the same nature as that seen in such species as *Todea superba*.

† From the 'Proceedings of the United-States National Museum,' April 24, 1882, p. 400.